A COMPUTATIONAL EXPERIMENT IN MESOCIRCULATION OF BLOOD

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Blood is capable of adapting itself in a great extent in order to provide nutrients to the organs at the time required to. This adaptability reflects in, for example, altering its viscosity along the circulatory loop, depending where blood is flowing in. Pathologies and individual characteristics do alter viscosity, as well.

It is known that blood behaves differently when flowing in large vessels, in which Newtonian behaviour is expected, and in medium and small vessels where non-Newtonian effects appear. It is accepted nowadays that it is, basically, the aggregation of the erythrocites together with the protein adhesion game that makes blood to behave in non-Newtonian manners. Several different non-Newtonian effects have been reported and several constitutive equations have been proposed to model these behaviours. None of them is the general constitutive equation.

The present work is concerned with characterisation of blood flow, especially in meso and microcirculation in the context of what is being called computational rheology [1]. Although clinical literature divides circulation into macro and microcirculation, the term mesocirculation is introduced here to differentiate the limb in vessel hierarchy from the non-Newtonian fluid mechanics point of view. Stabilised finite element methods based on [2] and [3] are used to analyse entrance vessel blood flows that are explored considering two constitutive equations based on the power-law relation in which the pseudoplastic effect is supported by a power function of the shear rate. Hematocrit effects are included in view of data from [4].

References

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